

FACT SHEET: Superior Barge Fuel Efficiency Claims are Questionable

The barge industry asserts that inland waterways barge traffic is more fuel efficient than other modes of transportation. Industry representatives cite a 2007 Texas Transportation Institute report¹ to support this claim. The report includes the data in Table 3 portraying the superior fuel efficiency of barges in shipping cargo compared with trains and trucks.

Fuel Efficiency Comparison of Transportation Modes	
Mode	Tons-Miles/Gallon
Inland Towing	576
Western Railroads	413
Eastern Railroads	413
Truck	155

Texas Transportation Institute's fuel efficiency comparison

However, these comparisons do not take into account the variation in miles traveled to get from one point to another by water, rail, or road. The comparison between the distance of two modes of transportation both leaving one destination and going to the same final destination is called "circuitry." It is acknowledged that nationally barges have a 1.3 to 1 circuitry factor when compared with trains,² which means that a barge must travel 30 percent farther than a rail car to reach the same destination, as shown below.

<u>System miles from same Point A to same Point B</u>		<u>System miles traveled</u>
Rail System Length: 1.0	_____	= 615 miles
Inland Waterways Average System Length: 1.30	_____	= 801 miles
UMR Inland Waterways Average System Length: 1.38	_____	= 850 miles

Any comparison of barge and rail efficiencies on the UMR-IWW must include the geographic realities of rivers. Rivers do not flow directly in straight lines; there are many turns that increase the distance a barge must travel. The rail system is not constrained by the flow of the river and follows a much straighter path to the Gulf of Mexico at New Orleans. But instead of comparing rail miles to barge miles on the Mississippi River using the acknowledged national 1.3 to 1 circuitry factor, the Texas report uses a barge to truck comparison to establish a 1 to 1 circuitry factor. (For comparison, a researcher at the University of Illinois³ estimated a 1.38 to 1 circuitry factor for barges specifically on the Upper Mississippi River.)

Also ignored in this report was the use by rail companies of "unit trains" for shipping grain long distances. Unit trains are made up of cars going to the same final destination carrying one type of commodity. A 2008 study by researchers at Iowa State University⁴ shows that unit grain trains moving from Iowa to New Orleans have a much better fuel efficiency – 640 versus 413 ton-miles per gallon – than an average train.

¹ Texas Transportation Institute - Center for Ports & Waterways, December 2007 (Amended March 2009), "A Modal Comparison of Domestic Freight Transportation Effects on the General Public Final Report," prepared for the U.S. Maritime Administration and the National Waterways Foundation, http://www.americanwaterways.com/press_room/news_releases/NWFStudy.pdf

² Cambridge Systematics, 1997, "NCHRP Report 388: A guidebook for forecasting freight transportation demand," Transportation Research Board, National Research Council, Exhibit A.2, page 51, supports the statement that overall barge circuitry relative to unit rail is approximately 1.30

³ Anthony V. Sebald, 1974, "Energy Intensity of Barge and Rail Freight Hauling," CAC Document No. 27, University of Illinois

⁴ Baumel, C. Philip, Charles R. Hurburgh, and Tenpao Lee, 2008, "Estimates of Total Fuel Consumption in Transporting Grain from Iowa to Major Grain Countries by Alternatives Modes and Routes," Iowa State University, <http://www.extension.iastate.edu/Grain/Topics/EstimatesofTotalFuelConsumption.htm>

FACT SHEET: Superior Barge Fuel Efficiency Claims are Questionable

Incorporating both the rail circuitry factor and unit grain trains into a revision of the Texas Transportation Institute's table (see Table 4) shows that barges have virtually no fuel efficiency advantage over an average train and are far less fuel efficient than unit grain trains.

Revised Fuel Efficiency Comparison of Transportation Modes	
Mode	Tons-Miles/Gallon
Inland Towing (1.3 circuitry)	443
Inland Towing (1.38 circuitry)	417
Average Railroad	413
Unit Grain Train	640

The primary grain commodity used in the NESP studies to support the construction of new locks is corn, which is also shipped by unit grain trains. The barge industry, as stated above, asserts that shipping commodities on barges is more efficient than rail, saving fuel and therefore emitting fewer pollutants. However, normal rail shipping is nearly equivalent to the fuel efficiency of barge shipping, and unit grain trains are significantly more efficient than barges.

Historic energy use information is calculated by the U.S. Department of Energy (DOE) in their Transportation Energy Data Books. The DOE has been calculating this information since 1970 and the 2009 Energy Data Book specifically includes a direct comparison between railroads and barges using BTUs per ton-mile. In this comparison a lower number is better. In 1970 railroads used an average of 691 BTUs per ton-mile while barges used 545 BTUs per ton-mile. By 2006, the latest available data for barges, the average for railroads had dropped to 330 BTUs per ton-mile and barges had increased to 571 BTUs per ton-mile (below).

Table 2.15 Inter-city Freight Movement and Energy Use in the United States, 2006 and 2007				
	Waterborne commerce		Class I railroads	
	2006	2007 ^a	2006	2007
Number of vehicles (thousands)	41	^a	24 ^b	24 ^b
Ton-miles (billions)	562	^a	1,772	1,771
Tons shipped (millions)	1,024	^a	1,957	1,940
Average length of haul (miles)	549	^a	906	913
Energy intensity (Btu/ton-mile)	571	^a	330	320
Energy use (trillion Btu)	321	^a	585	567
Source: See Appendix A for Freight Movement and Energy Use.				
^a Not available.				
^b Number of locomotives.				
2009 Transportation Energy Data Book: Edition 28 Prepared for the Office of Energy Efficiency and Renewable Energy U.S. Department of Energy				

To review the entire "Big Price – Little Benefit" report and find out why the proposed locks on the Upper Mississippi River are not economically viable, go to: www.iwla.org/bigprice

The Nicollet Island Coalition is a group of conservation and environmental organizations formed in 1994 to address restoration issues on the Upper Mississippi River and provide coordinated advocacy work on Upper Mississippi River issues.